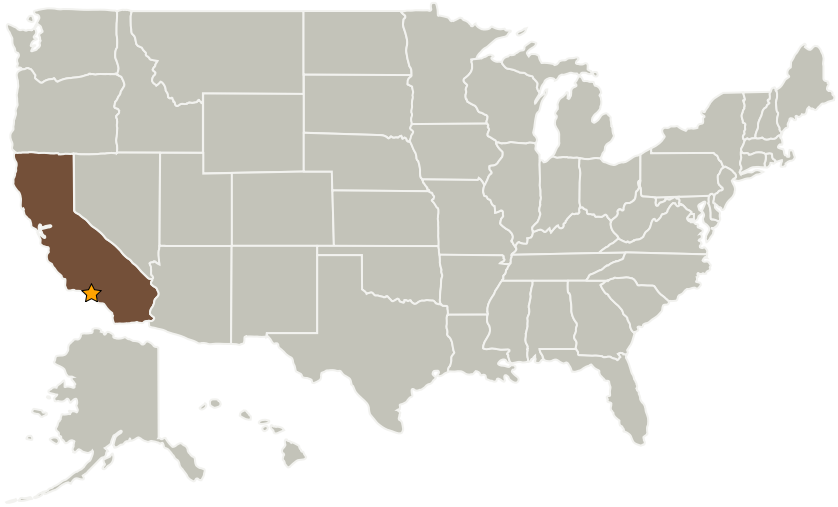
Cavity-Enhanced Gas Analyzer for In-Situ Sampling of Biogenic Gases and Their Isotopes, Phase I

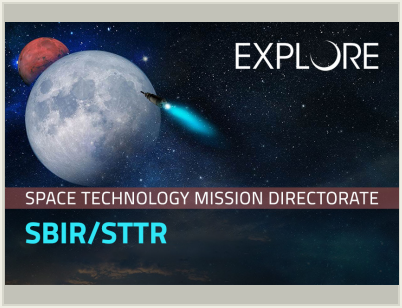
Completed Technology Project (2006 - 2006)

Project Introduction

This Small Business Innovation Research Phase I project concerns the novel application of cavity-enhanced absorption spectroscopy to quantify biogenic gases (CH4, CO2, and NH3) and their isotopes (13C/12C and 18O/16O) on Mars and other future planetary missions. These species and their isotope ratios are of critical importance to NASA, because they have been implicating in biological activity and can provide decisive evidence for a biosphere on other planets. In Phase I, we will demonstrate technical feasibility by building a miniature, lightweight Off-Axis ICOS spectrometer and employing it to accurately quantify biogenic gases and their associated isotopes at concentrations approximating the expected Martian atmosphere. The prototype will be tested under both mechanical vibrations and thermal fluctuations to validate its robustness. Final Phase I work will entail developing a gas sampling strategy suitable for Mars and designing a complete analyzer system. In Phase II, Los Gatos Research will build and deliver this analyzer with a fully-integrated electronics package that satisfies NASA's size, weight, and power requirements for Mars deployment. The proposed instrument will be the first sensor capable of measuring the concentrations and isotopes ratios of critical biogenic gases in a compact, lightweight, and low-power package.

Primary U.S. Work Locations and Key Partners





Cavity-Enhanced Gas Analyzer for In-Situ Sampling of Biogenic Gases and Their Isotopes, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Cavity-Enhanced Gas Analyzer for In-Situ Sampling of Biogenic Gases and Their Isotopes, Phase I

Completed Technology Project (2006 - 2006)

Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Los Gatos Research	Supporting Organization	Industry	Mountain View, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables